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ABSTRACT

This study, which deals with the status of science education in the middle schools of South Carolina, is intended to be useful in: (1) developing middle school science teacher preparation programs; (2) revising certification requirements for middle school science teachers; (3) planning staff development activities for middle school science teachers; and (4) examining the science teacher's role in decisions which affect middle school science programs. Data were compiled from a survey involving 77 of the 130 South Carolina middle schools and 300 individual teachers provided additional information. Results are described in Section I under the headings of Demographic Characteristics, Programmatic Characteristics, Instructional Characteristics, Staff Development, Information and Decision-Making, and Limitations. Section II contains data analyses. The Appendix includes the cover letter accompanying the questionnaire, and the survey instrument. References are listed at the end of the report. (Author/SA)

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SOUTH CAROLINA
MIDDLE SCHOOL SCIENCE SURVEY

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Dr. Arthur Justice, Dean, School of Education, USCS, provided both psychological support and the resources of USCS; Joe Greer and Freddie Parker who typed the first draft; Gretchen Worth (Word Processing Center) who typed the final draft; and Allen Gray who designed the cover. In addition, were the principals and middle school science teachers who took the time to complete the questionnaire. To all of these people I express my sincere appreciation for their assistance.

In this report I have tried to report my findings objectively and without the addition of editorial comments. The reader is charged with that responsibility—making sense out of what is known and deciding where do we go from here. I invite each reader to send me their comments as I would be happy to respond and begin a serious dialogue.

Ed White

July 10, 1979

Introduction

A few years ago people were talking about the new organizational innovation—MIDDLE SCHOOLS. In 1979 middle schools are not new; they are an established fact. In 1967 there were 1,101 middle schools identified in the United States. Six of these middle schools were in South Carolina. In 1977, a replication study by Center for Professional Development (University of Kentucky) identified 4,060 middle schools—almost a 400% increase. In South Carolina 126 middle schools were identified—21 times the number in 1967. Clearly the middle school movement has progressed from a fad to an established entity in American schools.

This growth in the middle school concept was greatly encouraged by the action of the South Carolina Board of Education when teacher certification regulations were approved in 1976. In 1977 the South Carolina Middle School Association was organized and its members have initiated numerous activities to enhance the expertise of educators concerned with middle schools in South Carolina.

During the past decade there have been numerous studies done in middle schools, on a regional, state, and national level. Although these data have been interesting and enlightening, they have tended to be too general to be of direct assistance to key decision makers. This study was designed to build on previous research and to focus specifically on the status of science education in the middle schools of South Carolina.

It is hoped that these data will be useful in the following areas:

1. Development of middle school science teacher preparation programs.

2. Revision of certification requirements for middle school science teachers.
3. Identification of staff development activities for middle school science teachers.
4. Examination of the role of science teachers in decisions affecting middle school science programs.

Methodology

The survey instrument was developed after review of prior science education studies targeted at the elementary, junior high, and secondary level. Questions were selected for the following categories: demographic, program parameters, instructional strategies, staff development activities, and limitation factors. The completed instrument was composed of 65 questions related to these areas of interest. (Appendix A)

One hundred thirty middle schools were identified through the 1978-79 South Carolina Educational Directory published by the State Department of Education. Each middle school principal (May 1979) was sent six copies of the questionnaire and requested to distribute them to their science teachers (Appendix A). Seventy-seven schools returned questionnaires yielding a return rate of 59.3% of the middle schools in South Carolina. These 77 schools provided 300 individual responses from the science teachers of middle school children in South Carolina.

Although it would have been more effective to send the questionnaires directly to each teacher, there was no practical means of identifying each teacher by name. The return rate of 60% from individual schools and data from 300 individual teachers has been judged to be adequate for purposes of analysis. In any case no larger sample of data is available at the present time.

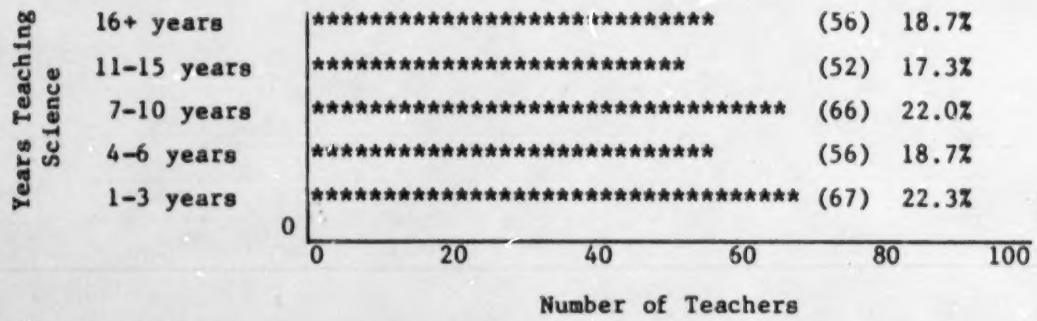
SECTION 1

I. DEMOGRAPHIC CHARACTERISTICS

Teachers of middle school science in South Carolina can be characterized by the following data:

1. Type of position
   a. 18% teach science in a self-contained classroom.
   b. 55% teach only science, in a departmentalized organization.
   c. 25% teach science plus another subject in a departmentalized organization.
2. Organization of School
   a. Grades 6-8 was the most common school organization accounting for 44.3% of all teachers (133, n = 300)
   b. Grades 5-8 accounted for 12% (36 teachers)
   c. Grades 7-8 accounted for 10.7% (32 teachers)

   The remaining 33% of the teachers who responded taught in schools which had 24 different organizational patterns.
3. Sex of Teachers
   a. 230 teachers were female (78%)
   b. 68 teachers were males (22%)
4. Number of Years Teaching Science
   a. 1-3 years, 67 (22%)
   b. 4-6 years, 56 (19%)
   d. 11-15 years, 52 (17%)
   e. 16 or more, 56 (19%)



5. Average Class Size

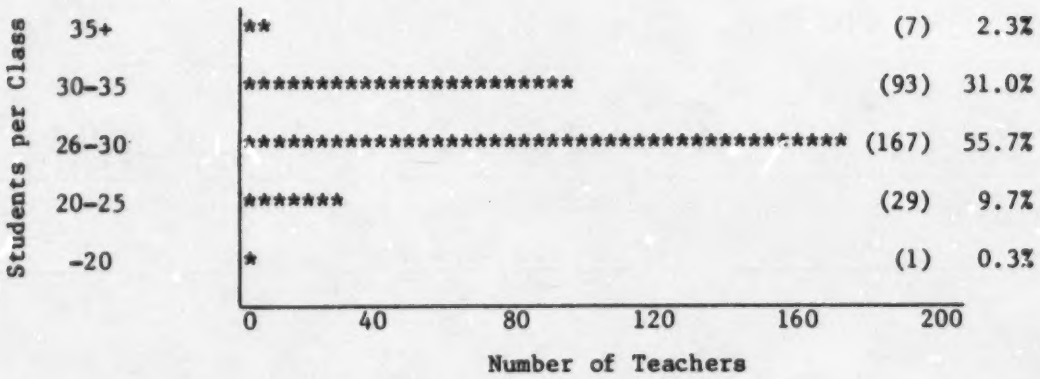
a. Less than 20 students-1 teacher (0.3%)

b. 20-25 students-29 teachers (10%)

c. 26-30 students-167 teachers (55.7%)

d. 30-35 students-93 teachers (31%)

e. 35 or more students-7 teachers (2%)



6. Number of Semester Hours of Science Courses

a. Less than 10 hours-29 teachers (10%)

b. 11-20 hours-90 teachers (30%)

c. 20-30 hours-67 teachers (22%)

d. 30-40 hours-30 teachers (10%)

Current regulations require a minimum of 20 hours of science for middle school science certification.

7. Number of Years Since Taking A Science Course

   a. 1-2 years-50 teachers (17%)

   b. 3-5 years-112 teachers (37%)

   c. 6-10 years-82 teachers (27%)

   d. 11-15 years-26 teachers (9%)

   e. 16 or more years-28 teachers (9%)

Approximately 45% of the teachers have not taken a science course in the last five years.

8. Number of Semester Hours of Science Methods

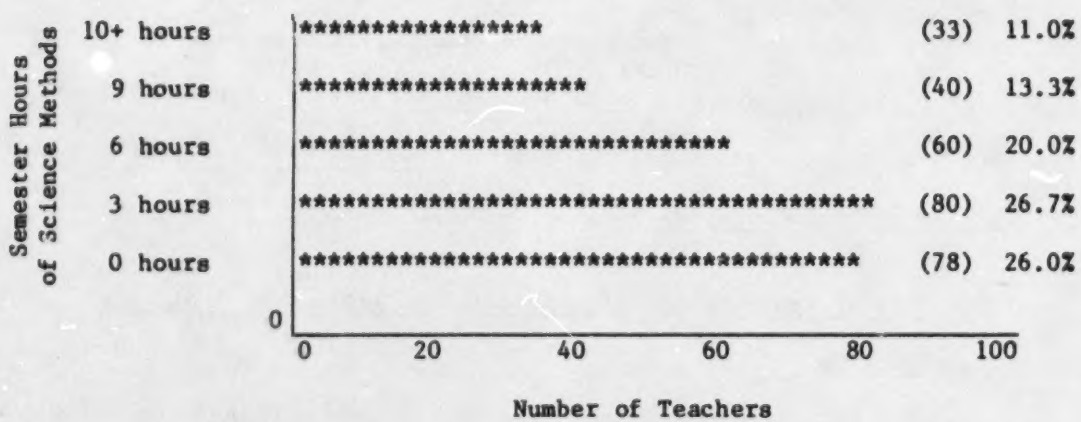
   a. Zero hours-78 teachers (26%)

   b. 3 hours-80 teachers (27%)

   c. 6 hours-60 teachers (20%)

   d. 9 hours-40 teachers (13%)

   e. 10 or more hours-33 teachers (11%)



Over 50% of these teachers have had one course or less in the teaching of science. 26% (78 teachers) have had no formal training in science education at the undergraduate or graduate level.

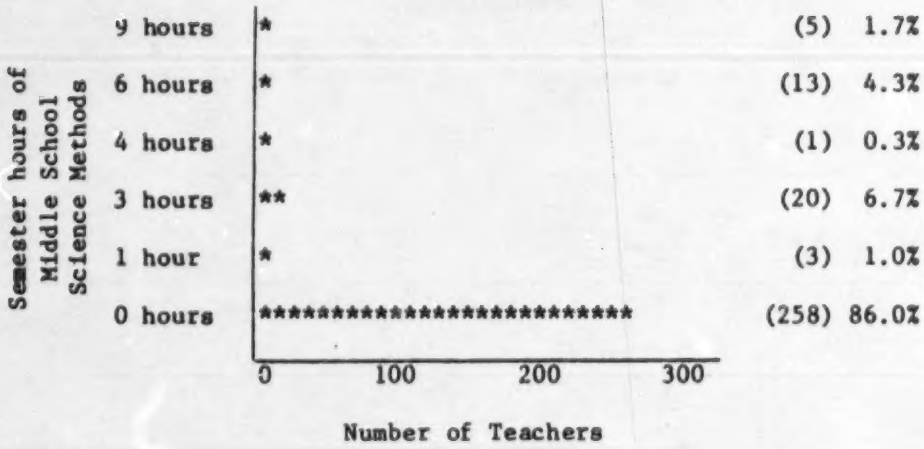
9. Number of Semester Hours of Middle School Science Methods

   a. Zero hours-258 teachers (86%)

   b. 3 hours-20 teachers (7%)

   c. 6 hours-13 teachers (4%)

   d. 9 hours-5 teachers (2%)



These data should immediately raise questions about current middle school science certification requirements. The present South Carolina regulations require only a course in the teaching of science with no grade level designation (i.e., middle school science). Although 74% of teachers have had a science methods course, only 14% have had professional training in middle school science.

10. Type of Teaching Certificate Held by Middle School Science Teachers

   a. 55% of middle school science teachers hold an elementary certificate

   b. 40% have a secondary science certificate

   c. 5% have a secondary certificate but not in science

11. Area of Concentration of Teachers with a Secondary Science Certificate (119 teachers)

a. 65% of teachers hold either a biology (38%) or a general science (27%) certificate

b. the remaining teachers are distributed evenly among the areas of chemistry, physics, earth science, and various combinations.

DEMOGRAPHIC SUMMARY

Based on these data a typical middle school science teacher in South Carolina would have the following characteristics: (1) teaches only science, (2) is female, (3) has taught science for 7-8 years, (4) has 26-30 students in class, (5) has taken 20-30 hours of science, (6) last took a science course 7-8 years ago, (7) has taken 3 hours of science methods, (8) has never taken a middle school science methods course, (9) teaches in a school with grades 6-8, and (1) if the teacher holds a secondary certificate her area of concentration will be biology or general science.

II. PROGRAMMATIC CHARACTERISTICS

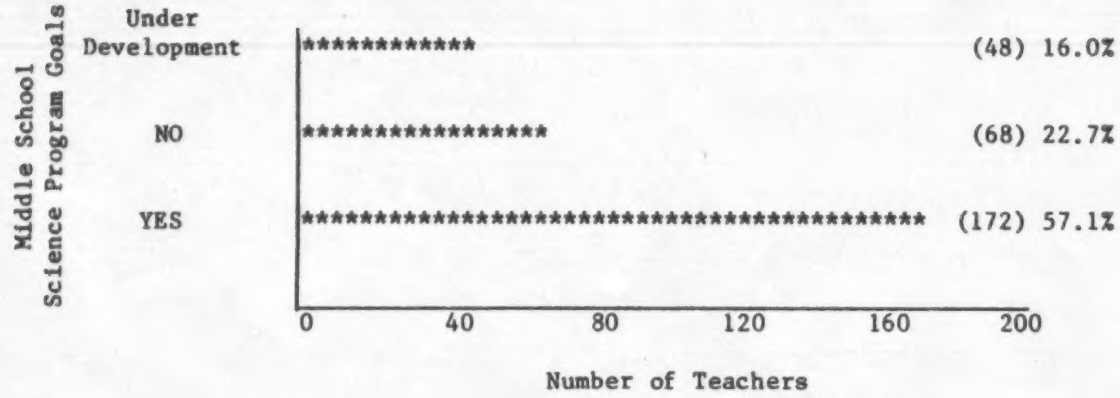
Several of the questions in this survey dealt with the nature of the middle school science program. The reader is urged to compare these data to the literature and their own personal perceptions of what a functional middle school science program should look like.

12. Middle School Science Program Goals

a. 57% of the teachers indicated that they had a set of program level goals to aid them in planning (172 teachers)

b. of the teachers who indicated that they had no program goals developed, 41% (48 teachers) indicated that middle school science goals were currently under development.

c. 23% (68 teachers) indicated that no science program goals had been developed and that they knew of no future plans to develop goals.



Teachers were then asked to rank a series of goal statements as currently emphasized in their middle school science program.

a. teaching the facts of science was selected as receiving the greatest emphasis (232 "major emphasis" rankings)

b. development of curiosity received 178 "major emphasis" rankings

c. developing self-concept was ranked third (167)

d. attitudes toward the environment was ranked 4th (out of 9 choices) by 158 respondents.

13. Middle School Science Course Outlines

a. 39% of the teachers indicated that a course outline had been developed for the science courses that they taught

b. 36% said that they had no outlines

c. 15% said outlines were in development

14. Science Relating to Other Subjects

a. a majority of teachers (68%) said that "applications to other subjects are included whenever appropriate"

b. 19% said that science is not related to any other subject

c. 11% described science as "interdisciplinary relating to math, reading, social studies, and fine arts"

15. K-12 Relationship

When asked the question "To what extent is the middle school science program related to the elementary and/or secondary science program?"

a. 56% responded "somewhat"

b. 24% responded "none"

c. 10% responded "highly"

16. Team Teaching

a. 66% of the teachers said that there was no team teaching in their school (not just science but schoolwide)

b. 25% said it occurred occasionally

c. 8% said teaming was a regular part of the school

17. Student Grouping

a. 34% of the teachers indicated that grouping was flexible and based on student interests or needs

b. 21% indicated no grouping of students occurred within their classes

c. 42% said that they used grouping techniques, but that all groups did the same tasks at the same time

18. Designing Middle School Science Programs

When asked to identify "the most important factor in designing science courses at your school," teachers said:

a. textbook--39%

b. program guides--22%

c. preference of individual teachers--26%

d. student interests--4%

e. other--6%

19. Science Activities/Experiments

In response to "Does the program provide opportunities for each student to explore and discover first-hand?" teachers responded:

a. not at all--6%

b. teacher/student demonstrations--57%

c. individual/small group investigations--35%

20. Environmental Education

a. 53% of the teachers surveyed said that environmental education was part of their school's curriculum

21. Where is Environmental Education Taught?

a. 68% said "integrated wth science"

b. 18% said "incidentally"

c. 3% said "as a separate subject"

d. 4% said "integrated with subjects other than science"

PROGRAM SUMMARY

A slight majority of science teachers (57%) have a set of science program goals to guide their instructional activities; 80% of the teachers identified "the facts of science" as the most important goal of middle

school science; only 39% said that they had course outlines; 10% indicated a high degree of correlation between the middle school science program and the total K-12 science program; science teachers generally do not use grouping techniques; textbooks were identified as the most important factor in designing science programs; and 35% of the teachers said that their science programs provide for individual/small group investigations by students.

III. INSTRUCTIONAL CHARACTERISTICS

22. Amount of Science Taught/Week

    a. 154 teachers (51%) reported teaching science 5 hours/week/class

    b. 39.7% (119) reported 2-4 hours of science/week/class

    c. 8% indicated teaching science 1 hour/week/class

23. Instructional Materials

    a. 35% of science teachers indicated using a "wide range of multi-level materials, including manipulatives, audio-visual equipment, and guest speakers"

    b. 63% said that they used a textbook as the primary means of instruction

24. Type of Instructional Materials

    a. single text--37%

    b. multi-texts--25%

    c. teacher-made materials--8%

    d. text plus special kit materials--27%

62% of the teachers responding to this question indicated a strong reliance on textbooks, collaborating the data reported for item 23.

25. Instructional Mode

When asked, "Generally, which of the following best describes how science is taught in your school?", teachers said:

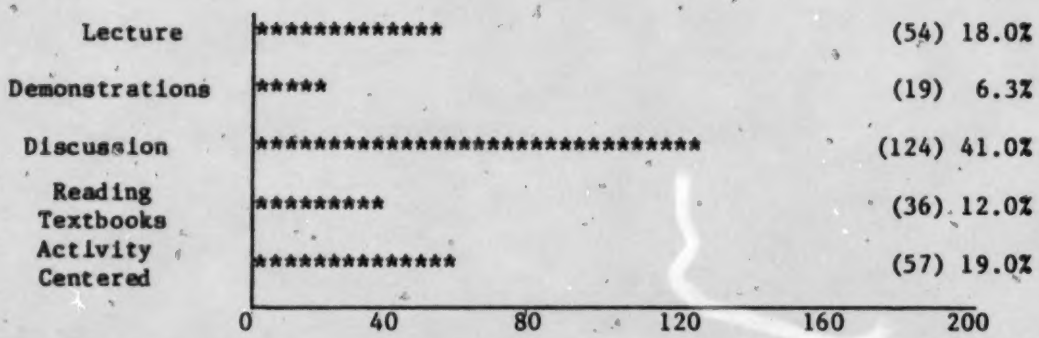
a. lecture--19%

b. demonstrations--12%

c. discussion--41%

d. read about--6%

e. activity-centered--18%



26. Frequency of Student Activities in Science

a. over 60% of the teachers indicated that their students are involved in activities less than twice/week

b. 30% of the teachers said that students do 2 activities/week

c. 10% reported students engaged in "hands on" activities nearly every science lesson

27. Faculty Satisfaction

a. 176 teachers (58%) described themselves as being very satisfied with their middle school science program

b. 17% reported being dissatisfied with their present program

INSTRUCTIONAL SUMMARY

Generally, South Carolina middle school science teachers rely heavily on textbooks as the primary vehicle for instruction. Class discussions were selected twice as often as "student investigations" and three times as often as "demonstrations" as the most prevalent mode of instruction. Only 40% of the teachers reported that their students do activities/investigations two or more times/week.

Less than one-fourth of the teachers indicated dissatisfaction with their present science program and 60% reported being "very satisfied."

IV. STAFF DEVELOPMENT

The South Carolina Education Finance Act of 1977 states, "Each school district board of trustees shall . . . (e) provide a program for staff development for all educational personnel on an annual and long range basis."[3] The following three questions attempted to determine how often and in what format staff development for middle school science teachers has been implemented.

28. Science Workshops

When asked, "To what extent has any teacher in your building attended science workshops or conferences during the past two years?" teachers responded:

a. no days--31%
b. one-half day--9%
c. one day--11%
d. two days--10%
e. more than two days--27%

29. District Staff Development Activities

Item 28 (Science Workshops) was broad based and included activities sponsored by universities, federal agencies, and the S.C.

Department of Education. This question was restricted to what the teachers' school division offered in the area of staff development for its science teachers.

a. zero/days/year--50%
b. half day/year--13%
c. 1 day/year--8%
d. 2 days/year--7%
e. more than 2 days/year--13%

30. Types of Staff Development Activities

Participants were asked to identify the most common format of their staff development program in science.

a. teacher meeting--43%
b. released time--5%
c. college/university courses--15%
d. after school workshops--16%
e. visits to other classrooms or schools--3%

Clearly most teachers are involved in in-service activities of relatively short duration. Only 30% are engaged in workshop type learning (c and d).

STAFF DEVELOPMENT SUMMARY

Items 27 and 28 point out that staff development for middle school science teachers is almost non-existent. These data indicate that less than one-half day/year (63% of teachers) is provided by South Carolina school divisions. Only 16% of these teachers indicated that their school provided any workshops to improve their teaching of science in the middle school. After school teacher meetings was the most common format for staff development activities.

V. INFORMATION AND DECISION-MAKING

Of prime concern was who makes what decisions and through what mechanisms they get pertinent information.

31. Information Dissemination

a. 44% of teachers reported that they get information about science programs through their building principal

b. science consultants, workshops, sales representatives, and college courses accounted for approximately 10% each

By a 4 to 1 ratio principals appear to be the crucial link in disseminating information to middle school science teachers.

32. Selection of Textbooks/Instructional Materials

a. in excess of 60% of the teachers reported that instructional materials were selected by a committee of teachers from the entire school district

b. 18% of such decisions were made by building faculties

c. 10% of these decisions were made by principals

Obviously teachers have a key role in the selection of textbooks and instructional materials, but item 31 indicated that the principal controls the information teachers receive or do not receive..

33. Selection of Equipment

Consistent with data presented in item 32, individual teachers or a committee of teachers appear to be making the decisions in regard to the selection of equipment. In 79% of the responses teachers said that they had the major role in equipment purchase.

34. Amount of Funds for Science Materials

Each respondent was asked to estimate the amount of funds available for science materials at their school/year.

a. less than $50/year--13%
b. $50-$150/year--23%
c. $500-$1000/year--17%
d. $500-$1000/year--17%
e. $1000+/year--6%

Although items 32 and 33 indicate that middle school science teachers are involved in certain instructional decisions, the limited funds available severely restrict the impact of those decisions.

VI. LIMITATIONS

Each teacher was asked to rank 14 items that "make it difficult to carry out an effective science program." The 14 most limiting factors were (from most limiting to least):

Most Limiting

a. - inadequate room facilities
   - lack of laboratory supplies and equipment
b. - difficulty in replacing materials
   - lack of adequate consultant help
   - lack of time for inservice training
c. - poor quality of equipment
   - lack of storage space for materials
d. - inappropriate text materials for middle school students
   - curriculum not sufficiently defined
e. - sharing materials among classes
   - belief that science is not important
f. - lack of teacher interest
   - lack of assistance from administration
g. - not enough time to teach science

Least Limiting

Not surprisingly two major limitations were identified: (1) insufficient equipment and instructional materials, and (2) inadequate staff development programs.

Section I of this report presents data as tabulated with minimal statistical analysis. In Section II selected items from the questionnaire have been subjected to additional analysis to establish any patterns of significance that could be used to generate recommendations for middle school science in South Carolina.

In Section II of the South Carolina Middle School Science Report each of the 65 variables has been subjected to analysis by CROSSTABS (SPSS program). Only a selected number of variables are presented in this report since over 3600 tables were generated using the CROSSTABS procedure.

1. Relationship of the Number of Semester Hours of Science

   a. Teachers whose present position included only teaching science had taken a significantly higher number of science courses (s = .0000)

   b. Female teachers reported a higher number of science courses than males (s = .0000)

   c. Hours of science content courses was related to years teaching science (s = .0000)

   d. Hours of science content was related to hours of science methods courses (s = .0000)

   e. No relationship existed between hours of science content courses and middle school methods courses (s = .27)

   f. Teachers who had more science courses rely more heavily on the textbook (s = .0119)

   g. There was no relationship between hours of science content courses taken and the following variables:

      (1) Use of materials other than textbooks (s = .0973)

      (2) Student investigations (s = .7147)

      (3) Use of grouping techniques (s = .8168)

      (4) Team teaching (s = .4056)

   h. Teachers with more science courses tend to use a single textbook, rather than multi-texts and/or kits (s = .0189)

2. Hours of Science Methods Courses

Increasing hours of science methods was related to:

a. the development of science program goals (s = .0285)

b. increasing levels of student involvement in classroom (s = .0884)

c. integration of other disciplines into the science program (s = .0667)

d. increased use of grouping techniques (s = .0089)

e. a decreased reliance on the text and individual teacher preference in designing a program and an increased utilization of a program guide (s = .0167)

f. an increase of student involvement in learning (i.e., activity-centered v. lecture) (s = .0003)

g. an increase in the frequency of student investigations (every lesson to never) per week (s = .0001)

h. greater emphasis on the value of developing curiosity as a program goal for middle school science programs (s = .0391)

i. greater emphasis on the value of relating science with personal problems or concerns of the students for middle school science programs (s = .0143)

3. Hours of Middle School Science Methods

Increasing hours of middle school science methods was related to:

a. increasing opportunities for staff development activities (s = .0655)

b. support for teaching environmental education as an integral part of the science program (s = .0037)

c. greater emphasis on the value of self-concept as a part of the middle school science program (s = .0000)

d. greater emphasis in the value of using science to develop leisure time interests (s = .0280)

4. Type of Certificate Held by Middle School Science Teacher

a. Female teachers were more likely to hold an elementary certificate than males (s = .0001)

b. Teachers who hold an elementary certificate have a larger class size than teachers with a science certificate (s = .0246)

c. Teachers who hold an elementary certificate reported increased years since taking a science course than did science certified teachers (s = .0000)

d. Elementary certified teachers have had fewer laboratory courses (s = .0000)

e. Elementary certified teachers are less likely to have science course outlines (s = .0584)

f. Secondary trained teachers (not in science) conduct fewer activities than elementary or science teachers (s = .0113)

g. Elementary teachers use more grouping techniques than do secondary trained teachers (science or other) (s = .0137)

h. Elementary and non-science secondary teachers rely more heavily on the textbook as the most important factor in designing their science program than do science-trained teachers (s = .0004)

5. Program Goals for Middle School Science

a. Teachers who are teaching just science are more likely to have science program goals than a self-contained classroom teachers (s = .0003)

b. Staffs which are organized into departments are more likely to have a set of science program goals (s = .0000)

c. Staffs with a designated science chairperson are more likely to have a set of science program goals (s = .0000)

d. Schools that utilize "a wide range of milti-level materials" are more likely to have a set of science program goals (s = .0000)

e. In schools that have developed science program goals, higher incidence of multi-disciplinary teaching was reported (s = .0212)

f. More student activities and demonstrations were reported in schools which have developed middle school science program goals (s = .0000)

g. Greater flexibility in grouping was reported by teachers who have science program goals to guide them (s = .0000)

h. The availability of a middle school science program guide was related to a K-12 science organization (s = .0000)

i. Discussion and "hands on" science were more prevalent in classrooms where teachers reported that they had a set of science program goals to guide them (s = .0610)

j. In schools that had science program goals, more time per week was spent in teaching science than in schools which lacked a set of science program goals (s = .0065)

k. Students conduct more science activities per week in schools that have developed science program goals (s = .0019)

l. Teachers who have a set of science program goals are more satisfied with their present science programs than those who do not have program goals (s = .0000)

m. Teachers who have a set of science program goals attend more science workshops than teachers who do not have science program goals (s = .0000)

n. Teachers who are guided by a set of middle school science program goals report that their school district sponsors more workshops (s = .0001)

o. In schools where science program goals have been developed environmental education is taught more often than in schools without science program goals (s = .0038)

p. Teachers who have a set of science program goals place more emphasis on "problem-solving" than do teachers who lack program goals (s = .0029)

q. Teachers who have a set of science program goals place more emphasis on "self-concept" than do teachers who lack program goals (s = .0175)

r. Teachers who have a set of science program goals place more emphasis on "curiosity" than do teachers who lack program goals (s = .0064)

s. Teachers who have a set of science program goals place more emphasis on "relating science with personal problems or concerns to students" than do teachers who lack program goals (s = .0015)

6. Science Course Outlines

a. Teachers who are teaching just science are more likely to have science course outlines than are self-contained elementary teachers (s = .0443)

b. Teachers who have taken a science course in the last ten years are more likely to have a science course outline to guide them in what they teach (s = .0039)

c. Elementary and secondary science trained teachers are more likely to have science course outlines than are teachers trained in other areas but teaching science (s = .0584)

d. Schools with organized science departments are more likely to have developed science course outlines (s = .0000)

e. Schools with a designated science chairperson are more likely to have developed science course outlines (s = .0000)

f. Schools that have developed science program goals are more likely to have developed science course outlines (s = .0000)

g. Teachers who have science course outlines are more likely to use multi-media, manipulative instructional materials than other teachers (s = .0005)

h. Teachers who have science course outlines have more individual and small group investigations in their classes than other teachers (s = .0001)

i. Teachers who have science course outlines utilize a greater variety of grouping techniques than other teachers (s = .0000)

j. Teachers who have science course outlines do more team teaching than other teachers (s = .0001)

k. Teachers who do not have science course outlines rely more on textbooks and personal preferences in designing courses than do other teachers (s = .0000)

l. In school districts where course outlines have been developed teachers report a higher level of continuity in the K-12 science program (s = .0021)

m. Teachers who have science course outlines rely less on a single textbook as their basic set of instructional materials than do other teachers (s = .0005)

n. Teachers who have science course outlines are more satisfied with their present science program than are other teachers (s = .0297)

o. Teachers who have science course outlines have attended more workshops in the last two years than other teachers (s = .0000)

p. Teachers who have science course outlines teach in school districts that sponsor more workshops than do other districts (s = .0001)

q. Teachers who have science course outlines teach in schools where higher levels of funds for science instruction are available (s = .0019)

r. Teachers who have science course outlines teach in schools where environmental education is a "definite part of the school curriculum" (s = .0561)

s. Teachers who have science course outlines place greater emphasis on "problem solving" than do other teachers (s = .0144)

t. Teachers who have science course outlines place greater emphasis on "developing students as future scientists" than do other teachers (s = .0012)

u. Teachers who have science course outlines place greater emphasis on "relating science with personal problems or concerns of the student" than do other teachers (s = .0122)

7. Methods of Teaching Science in Middle Schools

a. Female teachers utilize discussion as a technique four times more often than male teachers (s = .0101)

b. Discussion is the most prevalent mode of instruction (s = .0015)

c. Teachers with no science methods utilize lectures (34%) and reading in textbooks (42%) while teachers with 10 or more hours of science methods use discussion (28%) and activities (47%) as their most common method of instruction.

d. Teachers in a formally organized science department utilize discussion and activities more than other teachers (s = .0002)

e. Teachers who have a science chairperson utilize discussion and activities more than other teachers (s = .0057)

f. Teachers who have a set of science program goals use discussion and activities more than other teachers (s = .0610)

g. Teachers who utilize discussion and activities as their major mode of instruction also have the most flexible grouping arrangements (s = .0000)

h. Teachers who utilize discussion and activities as their major mode of instruction use a wider array of instructional materials than do other teachers (s = .0002)

i. Teachers who utilize an activity-centered mode of instruction involve their students in investigations more often than do other teachers (s = .0000)

j. Teachers who utilize an activity-centered mode of instruction are most satisfied with their present science program; teachers who utilize a "read-about" mode of instruction are least satisfied (s = .0617)

k. Teachers who utilize discussion and activity techniques teach in school districts that sponsor more staff development activities in science than do other school districts (s = .0105)

l. Teachers who utilize discussion and activity techniques value "problem-solving" as a program goal more than other teachers (s = .0000)

m. Teachers who utilize discussion techniques as their major mode of instruction value the development of a student's "self-concept" more than other teachers (s = .0528)

8. Frequency of Student Activities in Science

a. Students of female teachers conduct more activities than do students of male teachers (s = .0876)

b. Teachers who are secondary trained (not in science) conduct fewer student activities than do elementary or science trained teachers (s = .0164)

c. Teachers who are members of a formally organized science department conduct more activities than other teachers (s = .0000)

d. Teachers who have a set of science program goals conduct more activities than do other teachers (s = .0019)

e. Teachers who have science course outlines conduct more activities than do other teachers (s = .0176)

f. Teachers who emphasize the "facts of science" conduct fewer activities than do other teachers (s = .0216)

g. Teachers who emphasize "preparation for secondary science at the middle school level" conduct fewer activities than do other teachers (s = .0058)

h. Teachers who emphasize "problem-solving" conduct more activities than do other teachers (s = .0000)

i. Teachers who emphasize the "development of students' self-concept" conduct more activities than do other teachers (s = .0004)

APPENDIX A

UNIVERSITY OF SOUTH CAROLINA
at SPARTANBURG
SPARTANBURG, S.C. 29303

Spartanburg 578-1800
Greenville 271-9111

May 15, 1979

TO: South Carolina Middle School Principals

FROM: Dr. Edwin P. White, School of Education
University of South Carolina at Spartanburg

SUBJECT: Survey of Middle School Science

Although you may have reviewed many reports of "what is" or "what is not" happening in middle schools I expect that you, as I, have found the reports to be of such general nature that these data are of limited value. In order to provide useful data to key instructional leaders (e.g. principals, department chairpersons, or middle school directors) I have chosen to focus on a specific area of interest and concern: Middle School Science.

Included are several copies of a survey designed to generate data on South Carolina middle school science programs. Please distribute the surveys to the science teachers in your school, making sure that all grade levels are represented if there are not sufficient copies for all of the science teachers.

In all cases the data will be summarized on a state basis so that no single school can be identified. After collecting the completed questionnaires please return to me by May 22, in the stamped, pre-addressed envelope. All principals who return the questionnaires will be automatically sent a copy of the data collected from this survey.

The results of this survey will have many potential uses: such as, impacting on middle school certification requirements; undergraduate and graduate teacher education courses; proposals for state and federal grants; members of professional associations; and curriculum developers. I want to thank you very much for your assistance in this project and if I or any member of the Faculty of USCS can be of any help, please call (803) 578-1800 ext. 398.

The University of South Carolina: USC Aiken; USC Salkehatchie, Allendale; USC Beaufort; USC Columbia; Coastal Carolina College, Conway; USC Lancaster; USC Spartanburg; USC Sumter; USC Union; and the Military Campus.

MIDDLE SCHOOL SCIENCE SURVEY

BACKGROUND

1. Which of these best describes your present position?
   ___a. classroom teacher ___b. science teacher ___c. science teacher and math/social studies ___d. resource teacher

2. Sex: ___female ___male

3. How many years have you taught science?
   ___a. 1-3 ___b. 4-6 ___c. 7-10 ___d. 11-15 ___e. 16 plus

4. Check all grade levels taught in your school.
   ___4th ___5th ___6th ___7th ___8th ___9th ___10th

5. What is your average class size?
   ___a. -20 ___b.20-25 ___c. 26-30 ___d. 30-35 ___e. 35 plus

6. Number of students in your building.
   ___a. -250 ___b. 250-500 ___c. 500-750 ___d. 750-1000 ___e. 1000 plus

7. How many semester hours of college level science courses have you had?
   ___a. -10 ___b. 11-20 ___c. 20-30 ___d.30-40 ___e. 40 plus

8. How long ago did you take your last science (content) course?
   ___a. 1-2 yrs. ___b. 3-5 yrs. ___c. 6-10 yrs. ___d. 11-15 yrs. ___e. 16 plus yrs.

9. How many semester hours of science methods have you had?
   ___a. zero ___b. 3 ___c. 6 ___d. 9 ___e. 10 plus

10. How many of these hours (item #9) were specified for middle school science methods?

11. What type of teaching certificate do you hold?
    ___a. elementary ___b. secondary (science) ___c. secondary but not in science.

12. If you hold a secondary certificate, please indicate your specific area of concentration.
    ___a. General Science ___b. Biology ___c. Natural Science ___d. Chemistry/Physics ___e. Earth Science

13. How many above the semester hours identified in item #7 were laboratory hours?
    ___a. 1-3 ___b. 4-6 ___c. 7-10 ___d. 11-15 ___e. 15 plus

14. Which grade levels do you teach? (check all that apply)
    ___a. 5 ___b. 6 ___c. 7 ___d. 8 ___e. 9

SCIENCE PROGRAM COMPONENTS

15. Does your school have a science department that incorporates all teachers who teach science?

___ yes ___ no

16. Is there a science chairperson?

___ yes ___no

17. Do you have a set of middle school science program goals and objectives for your school?

___yes ___ no or ___ In Development

18. Do you have science course or unit guides developed for your school?

___yes ___no or ____In Development

19. Are students required to take science every year?

___yes ___no

20. Does the program provide for student differences in abilities and interests?

___a. We use only a basal program providing identical learning on an identical schedule.

___b. We supplement the textbook with additional materials.

___c. We use a wide range of multi-level materials and enrichment activities such as guest speakers, manipulative materials and audio-visuals.

21. Does the program provide opportunities for each student to explore and discover first-hand?

___a. We only talk about this.

___b. We sometimes have teacher or individual demonstrations.

___c. Individual and small group investigations are frequent.

22. How is science taught within the total school program?

___a. Science is a separate subject not related to any other subject.

___b. Science is a separate subject, but applications to other subjects are included whenever appropriate.

___c. Science is interdisciplinary relating to math, reading, social studies and fine arts.

23. To what degree is variety allowed in grouping students according to interests and needs?

___a. There is no variety in grouping, structure; total class teaching is used.

___b. There is variety in the grouping, but all groups do the same thing.

___c. There is flexibility to change group size and composition. Activities are designed to meet the needs and interests of specific small groups.

24. To what degree is team teaching (e.s. math, science, and social studies) used in your school?

___a. There is no team teaching.

___b. Occasionally but not a major feature of the school.

___c. On a regular basis as part of the basic school program.

25. Which of the following is the most important factor in designing science courses at your school?

___a. textbook.

___b. school district middle school program guide.

___c. preference of individual teachers.

___d. student interests.

___e. other (specify) _____

_____

26. To what extent is the middle school science program related to the elementary and secondary science programs?

___a. none ___b. somewhat ___c. highly

27. Generally, which one of the following best describes how science is taught in your school?

___a. Lecture.

___b. Demonstration.

___c. Discussion.

___d. Read-about.

___e. Activity-centered.

28. How much time per week is spent in teaching science?

___a. Less than 15 minutes.

___b. 15-45 minutes.

___c. 1 hour.

___d. 2-4 hours.

___e. 5 or more hours.

29. Which type of instructional materials are used most in your school in teaching science?

___a. Single text.

___b. Multi-texts.

___c. Teacher-made materials.

___d. Text plus special kit materials.

30. Indicate the frequency with which students conduct activities in science.

___a. Every, or nearly every, science lesson.

___b. Regularly (one or two lessons per week).

___c. Sometimes.

___d. Rarely or never.

31. How does the faculty feel about their present science program?

___a. Satisfied.

___b. Indifferent

___c. Dissatisfied.

32. To what extent has any teacher in your building attended science workshops or conferences during the past two years?

___a. None.

___b. Half day.

___c. 1 day.

___d. 2 days.

___e. More than 2 days.

33. To what extent is science in-service provided in your school district?

___a. None.

___b. Half day/yr.

___c. 1 day/yr.

___d. 2 days/yr.

___e. More than 2 days/yr.

34. Which of the following best describes in-service science opportunities in your school?

___a. Teacher meetings.

___b. Released time.

___c. College credit courses.

___d. After school workshops.

___e. Visitations.

35. How does your staff generally receive information about new science programs?

___a. Principal.

___b. Science consultant.

___c. In-service workshops.

___d. Sales representative.

___e. College courses.

36. Who determines what science textbooks/materials are purchased for your school?

___a. Principal.
___b. Building faculty.
___c. District teacher's committee.
___d. District administrator.
___e. None of the above.

37. Who determines what science equipment is purchased for your school?

___a. Teacher.
___b. Teacher committee.
___c. Principal.
___d. Science consultant.
___e. Central administration.

38. Which of the following is your best estimate of the amount of money available for purchase of <u>science</u> materials per year in your building?

___a. Under $50.
___b. $50-$150.
___c. $150-$300.
___d. $500-$1000.
___e. More than $1000.

39. To what extent are equipment and supplies for science available to teachers in your school?

___a. Plentiful.
___b. Adequate.
___c. Inadequate.
___d. Not available.

40. To what extent are audio-visual materials and equipment available to teachers in your school?

___a. Plentiful.
___b. Adequate.
___c. Inadequate.
___d. Not available.

41. Is environmental education-outdoor education a definite part of your school curriculum?

___a. Yes.
___b. No.

36

42. How is environmental education-outdoor education generally taught in your school?

___a. Separate subject.
___b. Integrated with science.
___c. Integrated with subjects other than science.
___d. Incidentally.

NOTE: To what extent are the following goals emphasized in your present science curriculum? For each question (#41 through #49) use one of the following responses:

A. Much emphasis.
B. Some emphasis.
C. No emphasis.

___ 41. To teach factual information concerning science:
___ 42. To prepare for secondary school science:
___ 43. To develop problem-solving skills:
___ 44. To develop a positive self-concept:
___ 45. To develop attitudes concerning the environment:
___ 46. To develop students as future scientists:
___ 47. To develop leisure time interests:
___ 48. To develop curiosity:
___ 49. To relate science with personal problems or concerns of the students:

LIMITATIONS

NOTE: Teachers have suggested many factors that make it difficult for them to carry out an effective science program. For questions (#50 through #63), To what extent, in your opinion, do the following factors present difficulty for effective science teaching? For each question, use one of the following responses:

A. Great difficulty.
B. Some difficulty.
C. No difficulty.

___ 50. Inadequate room facilities (i.e. no flat top tables, no running water, etc.):
___ 51. Inappropriate textual materials for middle school students:
___ 52. Lack of laboratory supplies and equipment:
___ 53. Need to share materials with the other classes:

___54. Difficulty in replacing materials:
___55. Poor quality of equipment:
___56. Lack of storage space for materials:
___57. Lack of adequate consultant help:
___58. Lack of teacher interest:
___59. Curriculum not sufficiently defined:
___60. School believes science is less important than other areas:
___61. Not enough time to each science:
___62. Lack of time for in-service training:
___63. Lack of active assistance from the principal or central administration:

When you have completed all items, please return to your principal. Your cooperation in this survey is greatly appreciated. The data collected from this research will be summarized and copies sent to all schools who have participated.

References

1. William M. Alexander. A Study of Organizational Patterns of Reorganized Middle Schools. Washington, DC: Office of Education, 1968.

2. Center for Professional Development. The Middle School in Transition. Lexington, KY: College of Education, University of Kentucky, 1978.

3. South Carolina Education Finance Act of 1977, July, 1977.